Original Research Article

Consequences of mulch practice on growth, flowering and yield of different varieties of China aster (*Callistephus chinensis*)

ABSTRACT

The investigation entitled with 'Consequences of mulch practice on growth, flowering and yield of different varieties of China aster (*Callistephus chinensis*)' were carried out at floriculture unit, Department of Horticulture, College of Agriculture, Dharwad, Karnataka during the year 2019-20. The experiment was laid out in Factorial Randomized Block Design consisting of 20 treatment combinations. Ten china aster varieties, Namdhari Pink (V_1), Namdhari White (V_2)**,** Arka Kamini (V_3), Arka Poornima (V_4)**,** Arka Shashank (V_5), Phule Ganesh pink (V_6)**,** Phule Ganesh Puple (V_7), AAC-1(V_8)**,** Miraj Local(V_9) and Pink Cushion (V_{10}) were planted under black plastic mulch (M2) and without mulch condition (M1)**.** The variety Phule Ganseh Purple under mulched condition **(**V_6M_2) registered maximum plant height of 54.03 cm, plant spread of 38.53 cm and number of primary braches 25.46. However, minimum number of days 34.58 and 48.63 days, were recorded in treatment V_5M_2 (Arka Shashank under mulched condition) for days taken for flower bud initiation, 50 per cent flowering respectively, compared to other treatment combinations. The treatment V_8M_2 (AAC-1 under mulched condition) was observed with maximum flowering duration (34.26 days). Phule Ganseh Purple under mulch condition (V_7M_2) and Phule Ganseh Pink under mulch condition (V_7M_2) recorded maximum flower diameter of 7.47 cm and flower stalk length of 42.77 cm respectively. V_7M_2 treatment combination recorded highest flower yield (158.76 g) as compared to remaining treatment combinations. The overall experiment resulted that Phule Ganseh Series under black plastic mulch found superior under northern transitional zone of Karnataka.

Keywords: Cultivars, mulch materials, flowers, China aster

INTRODUCTION

China aster [*Callistephus chinensis* (L.) Nees.] belongs to the family 'Asteraceae' and is a native of China. The blooms of china aster are used as cut flower, loose flower, bedding plant, flower decoration, bouquets, garlands and also in landscape gardening to provide mass aesthetic effect. In India, China aster is commercially cultivating on a large scale in Karnataka, Tamil Nadu, Andhra Pradesh, Maharashtra and West Bengal. Production and Productivity of crop can be enhanced by cultivating high yielding varieties and adaptation of improved horticultural practices like mulching.

Mulching will counter act the rapid evaporation of water from the soil surface and bring down the rapid drying thereby, conserving the soil moisture. It also suppresses weed infestation successfully and is also used as a mean of successful crop production mainly in place where irrigation facilities are scanty. It is important to produce flowers in different ways through which maximum benefits can be obtained from the limited available resources such as water which is main limited factor now days. It improves soil agrophysical properties by regulating the soil temperature and microbial activity. Consequently, it appears that mulching influences the growth and quality of flowers, so we carried this research with china aster cultivars.

Among various cultural practices followed in china aster, mulching is considered as an important practice to maintain the soil temperature during winter season and also control the weed. Hence, the present investigation was designed to determine the effect of black plastic mulch on growth, yiled and flowering quality of China aster varieties under northern transitional zone of Karnataka.

MATERIALS AND METHODS

The present investigation was carried out at floriculture unit, Department of Horticulture, College of Agriculture, Dharwad during the year 2019-20. This is located at 15^0 26' North latitude, 76^0 07' East longitude and altitude of 678 m above the sea level. Dharwad is situated in northern transitional zone of Karnataka (Zone-VIII).

The experimental field was prepared by ploughing the soil thoroughly up to a depth of 30-35 cm. Well rotten farm yard manure (FYM) was added @ 5 kg per meter square before transplanting of seedlings and mixed thoroughly in the soil. Then, the raised beds of required

size 1 m x 1 m x 30 cm (L x B x H) were prepared and levelled properly. The healthy, disease free and stocky seedlings of uniform size and vigour at 5-6 leaf stage were selected and transplanted during evening time. The seedlings of ten cultivars of China aster namely, Namdhari Pink (V_1), Namdhari White (V_2)**,** Arka Kamini (V_3), Arka Poornima (V_4)**,** Arka Shashank (V_5), Phule Ganesh pink (V_6)**,** Phule Ganesh Puple (V_7), AAC-1(V_8)**,** Miraj Local(V_9) and Pink Cushion (V_{10}) were planted in raised beds with spacing of 30 x 30 cm (Row x Plant) at without mulch (M1) and Black plastic mulch (M2) treatments. The irrigation was provided as and when needed through drip line with 2 liter per hour discharge capacity during rainy season, while it was given at an interval of 7-8 days and in winter given at interval of 4-5 days. Pinching of main shoot at one month after transplanting promotes growth and flowering. After pinching plants were applied with 19:19:19 (2-3 g l^{-1}). Timely and suitable plant protection measures were adopted to protect the experimental plants from the attack of insect pests and diseases. Experiment was laid out in Factorial Randomized Block Design. The observations were recorded on plant height (cm), plant spread (cm), number of primary branches, number of days taken for flower bud formation (days), number of days taken for 50 % flowering (days), flower duration (days), flower diameter (cm) and flower stalk length and flower yield per plant (g) were recorded and statistically analysed.

RESULTS AND DISCUSSION

Growth parameters

The treatment combination V_6M_2 (Phule Ganesh Purple under mulch condition) registered maximum plant height of 54.03 cm, plant spread of 38.53 cm and number of primary braches were 25.46. Whereas, the lowest values were recorded in V_5M_1 treatment combination. Differences in growth parameters among the cultivars may be due to the varietal character coupled with growing condition. Similar variation in growth parameters were given by Poornima *et al*. (2006) in china aster and in marigold by Singh *et al.* (2004).

Flower And Yield Parameters

Data regarding to flowering parameters like days taken for first flower bud initiation, days taken for 50 per cent flowering, flowering duration, flower diameter, flower stalk length

and yield parameters as influenced by different china aster cultivars and mulching are furnished in tables 2 and 3.

The interactions of varieties and mulching had significant influence on days taken for flower bud initiation, 50 per cent flowering and flowering duration. Significantly minimum number of days 34.58 and 48.63 days, were recorded in treatment V_5M_2 (Arka Shashank under mulched condition) for days taken for flower bud initiation, 50 per cent flowering respectively compared to other treatment combinations. While, treatment V_8M_2 (AAC-1 under mulched condition) was observed with maximum flowering duration (34.26 days).Whereas, minimum (21.45 days) was recorded in V_9M_1. This could be because of cultivar characters and enhanced vegetative growth might have influenced on early transformation of vegetative growth into reproductive stage in early cultivars as observed in the present study as well as earlier conclusions by Munikrishnappa *et al*. (2011) and Kumari *et al*. (2017) in china aster and Chourasia *et al*. (2015) in tuberose

The interactions of varieties and mulching found significant variation with respect to flower diameter, flower stalk length and flower yield. Treatment combination Phule Ganseh Purple under mulch condition (V_7M_2) recorded maximum flower diameter of 7.47 cm. Treatment combination Phule Ganseh Pink under mulch condition (V_7M_2) recorded maximum flower stalk length of 42.77 cm. V_7M_2 treatment combination recorded highest yield (158.76 g) as compared to remaining treatment combinations. The increased flower yield was because of increased flower size, flower weight and more number of flowers per plant. This type of difference among different varieties is mainly confined to genetic constitution of that particular variety in response to prevailing environmental condition. Baburao *et al*. (2018) in dahlia, Uddin *et al*. (2015) in chrysanthemum also registered similar outcomes.

CONCLUSION

Growth and flowering in China aster is genotype dependant. In present experiment Phule Ganesh Pink and Phule Ganesh Purple under black plastic mulch condition as compared to without mulch treatment for growth, flowering and yield parameters. Phule Ganesh Series were suitable for growing under northern transitional zone of Karnataka.

REFERENCES

Baburao, D. S., Kullur, L. R., Manavi, G. H. and Prasad, V. M., 2018, Evaluation of different hybrids for floral and yield parameters of dahlia (*Dahlia variabilis L.*) grown under Allahabad agroclimatic condition. *J. Pharm. Phytochem.*, 1(1): 141-142.

Chourasia, A., Viradia, R., Ansar, H. and Madle, S. N., 2015, Evaluation of different gladiolus cultivars for growth, flowering, spike yield and corm yield under Saurashtra region of Gujarat. *The Bioscan*, 10(1): 131-134.

Kumari, P., Kumar, R., Rao, T. M., Bharathi, T. U., Dhananjaya, M. V. and Bhargav, V., 2017, Evaluation of China aster [*Callistephus chinensis* (L.) Nees] F1 hybrids and parents for growth, flower quality, yield and postharvest life. *International J. Curr. Microbio. App. Sci.*, *6*(8): 1543-1549.

Munikrishnappa, P. M., Patil, A. A., Patil, V. S., Patil, B. N., Channappagoudar, B. B. and Alloli, T. B., 2013, Studies on the growth and yield parameters of different genotypes of China aster (*Callistephus chinensis* Nees). *Karnataka J. Agril. Sci.*, 26 (1): 107-110.

Poornima, G., Kumar, D. P. and Seetharamu, G. K., 2006, Evaluation of China aster (*Callisthephus chinensis* (L.) Ness) genotypes under the hills zone of Karnataka. *J. Orn. Hort.*, 9 (3): 208-211.

Singh, D., Sen, L. N. and Sindhu, S. S., 2004, Evaluation of marigold germplasm under semi-arid conditions of Rajasthan. *Haryana J. Hort. Sci.*, 32 (4): 206-209.

Uddin, A. F. M. J., Taufique, T., Ona, A. F., Shahrin, S. and Mehraj, H., 2015, Growth and flowering performance evaluation of thirty two chrysanthemum cultivars. *J. Biosci. Agri. Res.*, *4*(1): 40-51.

Table 1: Effect of black plastic mulch on plant height (cm), plant spread (cm) and number of primary branches of China aster cultivars.

Varieties (V)	Plant height (cm)			Plant spread (cm)			Number of primary branches		
	M_1	M_2	Mean	M_1	M_2	Mean	M_1	M_2	Mean
V_1	37.56	47.21	41.89	24.26	29.64	26.95	15.11	20.63	17.69
V_2	36.72	45.42	41.07	22.23	27.87	25.05	13.55	18.99	16.27
V_3	33.07	41.09	37.08	20.05	25.57	22.81	11.09	15.35	13.21
V_4	38.89	50.63	44.26	25.27	32.53	29.15	15.17	18.67	16.92
V_5	30.21	39.75	35.08	18.65	24.29	21.48	7.95	13.05	10.50
V_6	48.06	54.03	50.81	30.11	38.53	34.31	19.44	25.46	22.45
V_7	46.28	52.24	49.26	28.37	36.42	32.39	16.03	22.09	19.06
V_8	45.06	50.64	47.85	25.72	33.16	29.43	15.59	21.02	18.31
V_9	44.15	49.17	46.91	24.94	31.96	28.46	14.05	19.80	16.92
V_{10}	43.07	48.51	46.29	23.44	30.27	26.86	12.97	17.73	15.35
Mean	40.31	47.82		**24.40**	**30.97**		**14.09**	**19.28**	
	S.Em.±		**C.D. (at 5 %)**	**S.Em.±**		**C.D. (at 5 %)**	**S.Em.±**	**C.D. (at 5 %)**	
Varieties	0.29		0.85	0.12		0.36	0.68	0.23	
Mulch (M)	0.13		0.38	0.05		0.16	0.31	0.10	
Intraction (V × M)	0.40		1.21	0.17		0.52	0.96	0.32	

M_1: Without Mulch **M_2**: With Mulch

Table 2: Days taken for first bud initiation, 50 per cent flowering and duration of flowering of china aster as influenced by varieties and mulching

Varieties	Days taken for first bud initiation	50 per cent flowering	Duration of flowering

(V)	M_1	M_2	Mean	M_1	M_2	Mean	M_1	M_2	Mean
V_1	47.64	40.93	44.28	62.33	54.78	58.56	26.05	30.50	28.27
V_2	51.84	43.67	47.75	67.69	58.98	63.34	24.13	28.02	26.07
V_3	52.71	45.63	49.17	67.71	60.64	64.18	25.95	32.12	29.03
V_4	46.97	40.36	43.67	64.06	58.87	61.47	26.53	30.76	28.65
V_5	41.91	34.58	38.24	56.68	48.63	52.66	26.00	28.44	27.22
V_6	64.73	57.67	61.19	82.58	75.44	79.01	25.34	29.06	27.20
V_7	62.82	57.71	60.27	80.72	74.48	77.60	27.76	32.00	29.88
V_8	47.99	45.95	46.97	66.16	61.73	63.95	29.11	34.26	31.68
V_9	55.11	49.57	52.34	71.78	66.62	69.20	21.45	24.82	23.14
V_{10}	58.94	52.63	55.79	73.14	67.35	70.25	22.58	26.08	24.33
Mean	**53.06**	**46.87**		**69.29**	**62.75**		**25.49**	**29.60**	
	S.Em. ±		**C.D. (at 5 %)**	**S.Em.±**	**S.Em. ±**		**C.D. (at 5 %)**	**C.D. (at 5 %)**	**S.Em. ±**
Varieties	0.42		1.23		0.24		0.71		0.33
Mulch (M)	0.19		0.55		0.11		0.32		0.15
Intraction (V × M)	0.59		1.74		0.34		1.01		0.46

M_1: Without Mulch **M_2**: With Mulch

Table 3: Flower diameter, flower stalk length and flower yield per plant of china aster plants as influenced by varieties and mulching

Varieties (V)	Flower diameter (cm)			Flower stalk length (cm)			Flower yield per plant(g)		
	M_1	**M_2**	**Mean**	**M_1**	**M_2**	**Mean**	**M_1**	**M_2**	**Mean**
V_1	4.99	5.24	5.12	31.06	33.47	32.26	30.42	44.44	37.43
V_2	4.46	4.87	4.66	29.64	32.45	31.04	26.32	36.74	31.53
V_3	4.36	4.51	4.43	29.81	31.27	30.54	33.95	48.10	41.03
V_4	6.27	6.69	6.48	34.00	36.62	35.31	37.63	46.42	42.03
V_5	3.71	3.99	3.85	28.02	30.06	29.04	22.25	31.62	26.93
V_6	6.15	6.47	6.31	38.59	40.26	39.42	41.84	57.07	49.45
V_7	7.14	7.47	7.31	41.74	42.77	42.26	49.28	61.57	55.42
V_8	4.92	5.26	5.08	33.76	37.22	35.49	38.89	52.08	45.48
V_9	5.11	5.51	5.31	35.95	39.48	37.72	32.43	40.80	36.62
V_{10}	5.48	5.69	5.58	32.66	34.15	33.40	28.81	40.25	34.53
Mean	**5.26**	**5.57**		**33.52**	**35.77**		**34.18**	**45.91**	
	S.Em. ±		**C.D. (at 5 %)**	**S.Em. ±**		**C.D. (at 5 %)**	**S.Em. ±**	**C.D. (at 5 %)**	
Varieties	0.02		0.07	0.27		0.79	0.49	1.46	
Mulch (M)	0.01		0.03	0.12		0.35	0.22	0.65	
Intraction (V × M)	0.03		0.09	0.38		1.12	0.69	2.06	

M_1: Without Mulch **M_2**: With Mulch